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Environmental Asbestos Contamination: What Are the Risks?

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the evaluation of smokers, but positive findings cannot necessarily be treated as false in these subjects since they have active smoking exposure. The *ad hoc* "Falling Ratio Working Group" has recently comprehensively described the problems of false-positive results and competing definitions of abnormality, as well as provided fifth percentile LLNs for many widely used reference value prediction equations. Their comments and software are available on Dr. Philip Quanjer's Web page at http://www.spirxpert.com/controversies/controversy.html. The reader is advised to take advantage of this resource.

Finally, supporters of using fixed cut-off points to define abnormality often comment on the "simplicity" of using a fixed FEV_1/FVC ratio and FEV_1 percentage of predicted to determine abnormal results. However, if more of the currently available spirometers would display the fifth percentile LLN (which they can easily do), interpretation incorporating the LLN would be greatly simplified. It is unfortunate that a number of spirometer manufacturers claim that the fifth percentile LLN is used in their interpretation algorithms (following the 2005 ATS-ERS recommendations), but they fail to include the LLN in their spirometry printouts. Primary care health professionals will be able to easily understand and use the LLN to evaluate their patients when the LLN is included as a standard feature in the printout of test results. When LLNs are printed out, primary care health professionals can avoid using the "simple" but flawed definitions of abnormality put forward by GOLD, and reduce the probability of false-positive results when screening for COPD.

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Environmental Asbestos Contamination

What Are the Risks?

Malignant mesothelioma is a well-recognized risk of exposure to asbestos, and the disease may occur after relatively brief, low-level, or indirect exposures. Consequently, there have been concerns regarding exposures to asbestos contaminating the environment.[1] One highly publicized example is contamination of the town of Libby, MT, by tremolite asbestos occurring in the nearby vermiculite mine.[2] Recently, the Agency for Toxic Substances and Disease Registry convened an expert panel in Atlanta, GA, to discuss the potential risks of environmental asbestos contamination in communities throughout the United States. A number of questions remain unanswered. What is the magnitude of the risk (if any) to these communities? Can the risks be quantified, and what are the parameters that best predict the risk of mesothelioma? Are there gender differences in susceptibility, and are young children who are exposed to asbestos (*eg*, on playgrounds) at greater risk than adults?

The tragedy of Wittenoom, WA, Australia, has provided the opportunity to obtain some answers to these questions. Crocidolite (blue) asbestos was mined in this location from 1943 to 1966. As of 2002, 254 cases of mesothelioma had been reported from exposures at Wittenoom, accounting for about 5% of all cases of mesothelioma observed in Australia.[3] Tailings from the mine and mill were used in the construction of roads, parking, school playgrounds, and a race course, and were even used in yards to suppress dust from red clay. Consequently, there was ample opportunity for environmental exposure to asbestos among the 4,768 residents of Wittenoom who never worked in the mine or mill and were never exposed occupationally elsewhere. Reid et al[4] provide the most recent follow-up information concerning this cohort in the current issue of *CHEST* (see page 376).

The results are sobering. To date, there have been 67 cases of mesothelioma among the Wittenoom residents, including 31 cases in women. Twenty-seven of these women reported laundering the clothing of mine or mill workers, which is a well-recognized cause of mesothelioma among women in the United States.[5] The relative risk of mesothelioma increased with duration of exposure, estimated dose, and latency interval. Women had a steeper dose-response curve, which was just significant at the $p = 0.05$ level, than men. However, there was no evidence of an increased susceptibility to mesothelioma among children.[4]

The estimated death rate from mesothelioma in this population was 710 cases per million person-years (see Table 2 in the article), and the mean cumulative exposure was 5.5 fibers/mL/yr.[4] If one assumes that the background death rate from mesothelioma is one case per million person-years,[5] and further assuming that the risk is a linear dose response with no identifiable threshold,[6] then exposure to Wittenoom blue asbestos doubles the background risk of mesothelioma at a cumulative level of 0.015 fiber/mL/yr. This is equivalent to approximately 2 months of exposure at the current Occupational Safety and Health Administration permissible exposure limit of 0.1 fiber/mL. Although these figures are rather alarming, it is reassuring that the vast majority (up to 95%) of asbestos used in the past in the United States was chrysotile (white) asbestos, and the best estimates indicate that a higher dose of white asbestos of several hundred times would be necessary to achieve a similar risk.[7,8] It is possible that there is a threshold of exposure to asbestos below which mesothelioma will not occur, but such a level has yet to be identified.

Another important observation from the study of Reid et al[4] is that the youngest individual in whom mesothelioma was diagnosed at Wittenoom was 26 years old at the time of diagnosis. This is the same age as the youngest mesothelioma case reported from another environmental tragedy that occurred in three small villages in the Anatolian region of Turkey, where an epidemic of mesothelioma followed environmental contamination with erionite, an asbestiform fibrous mineral.[9] The present author's consultation files include > 2,500 cases of mesothelioma, with lung fiber burden analyses performed in > 400 of these cases. The youngest age at diagnosis of a mesothelioma case confirmed to be asbestos related was 28 years.[5] Taken together, these observations from three independent sources would indicate that mesothelioma occurring in individuals < 25 years of age is unlikely to be related to asbestos.[10]

Hopefully, tragedies such as those at Wittenoom and in the Anatolian region of Turkey can be avoided in the future. Studies such as the careful observations of Reid et al[4] may provide useful information to help guide policymakers who are dealing with potential environmental contamination of communities with asbestos. Identification of the fiber type and the concentrations of asbestos in the ambient air along with the size and demographics of the exposed population can be used to predict the likelihood of future occurrence of asbestos-related disease, including mesothelioma.[6–8] However, it is no trivial matter to determine what level of risk is "socially acceptable," and any means of dust suppression or avoidance of exposure is recommended, especially when exposures are to asbestos fiber types as dangerous as Australian blue asbestos.

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Getting What We Pay For

The advent of airway stenting and related interventional bronchoscopic procedures has undoubtedly improved the lives of our patients, particularly improving the palliative care of patients with advanced lung cancer.[1–3] In this issue of *CHEST* (see page 579), Ernst and colleagues[4] review the indications for airway stenting, discuss variations in stent design and materials that bear on the clinical use of these devices, describe the procedural techniques used to place stents, and then review the payments Medicare makes to the interventional pulmonologist and facility for placing an airway stent. The improvement in care resulting from these interventions comes at a financial cost. In the absence of these relatively new advances, disease would simply progress according to its natural history. As is evident from the clinical management algorithms Ernst and colleagues present, these bronchoscopic interventions rarely replace other services; they are additive to the traditional care of patients with central airway obstruction. The net gain in quality and duration of survival achieved for the net increase in costs, the marginal cost-effectiveness, should inform discussion about the value these advances bring relative to other medical interventions. Unfortunately, the evidence necessary to establish the marginal cost-effectiveness of these interventions simply is not yet available.

Ernst and colleagues analyze the work, practice expense, and malpractice relative value units for the components of the interventional pulmonary procedures likely to be performed on a patient with central airway obstruction. Based on the Medicare payment methodology for converting relative value units to a monetary value and applying the Correct Coding Initiative (CCI) edits to determine which individual services are payable at 100%, which are subject to a concurrent procedure discount of 50%, and which are not payable as incidental or mutually exclusive to the primary procedure, the resulting payment for airway stenting is compared to the payment for Evaluation and Management (E&M) services that would require the same amount of time. In what is likely to be a surprise both to those whose practice is dominated by procedures and to those whose practice is dominated by cognitive E&M services, airway stenting procedures pay less per hour than E&M services. Before simply filing this outcome next to *Revenge of the Nerds*, it is worth reviewing the components of the Medicare payment system that produce this result and considering the health policy implications.

Put forth by Hsiao et al[5] in the late 1980s as an alternative to the system of payments based on historical charges, and in an effort to more rationally assign monetary values to the broad range of services delivered by physicians, the Resource Based Relative Value Scale (RBRVS) was adopted by Congress in 1989 and implemented in the Medicare Fee Schedule in 1992. RBRVS establishes a value for every current procedural technology (CPT) code based on the following: (1) total work input performed by the physician for each service; (2) practice costs, including malpractice premiums; and (3) the cost of specialty training. This value is then converted to a monetary value by applying a standardized conversion factor. The CCI was established by Medicare in 1996 to promote national correct coding methodologies and to control improper coding leading to inappropriate payments.[6] The CCI is based on coding conventions defined in the American Medical Association CPT manual, national and local policies and edits, coding guidelines developed by national societies, analysis of standard medical and surgical practices, and a review of current coding practices. The payment for a given service is determined by the total RBRVS value of the component procedures and the application of CCI to determine which procedures are payable. The introduction of new procedures, advances in technology making some procedures simpler and some more difficult to perform, the unique circumstances of individual patients, and other factors conspire to make physician and facility compensation less rational in certain situations. While the entities that maintain these standards should continuously update them to make the resulting payments as rational as possible for all situations, it is with great peril that one tampers with the value